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Ames Research Center
Moffett Field, Calif. 94035

and

Aviation Safety Reporting System Office
Battelle's Columbus Division
Mountain View, Calif. 94043

NASA

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NOTE REGARDING STUDIES OF NEAR MIDAIR COLLISIONS

In response to requests from the FAA and various other organizations in the aviation community, the ASRS staff has conducted several studies of reports of near midair collisions. Similar studies have been under way within the FAA. It has been intended to include analytical reports of the results of the ASRS studies in this quarterly report; however, in order to permit detailed review and comparison of the finding of all the studies, it is necessary to delay publication of the ASRS results. They will appear in the ASRS Tenth Quarterly Report, which will be largely devoted to studies of human and system factors associated with potential conflicts and near midair collisions.

NASA AVIATION SAFETY REPORTING SYSTEM:

NINTH QUARTERLY REPORT

Ames Research Center
and
Aviation Safety Reporting System Office*

SUMMARY

This ninth quarterly progress report of ASRS operations contains two analytic studies and a section illustrating the alert bulletin process.

The first study, Distraction – A Human Factor in Air Carrier Hazard Events, looks at one of the human factors frequently mentioned in ASRS reports as a cause of or contributor to hazardous events. The report describes a study of distractions, an element in the series of investigations of air carrier human factors being conducted by the ASRS research group.

The second study, A Summary of the Characteristics of the ASRS Database, discusses the attributes of the safety reports that have been analyzed, processed, and entered into the ASRS database since the program's inception.

A sampling of alert bulletins and responses to them is also presented.

INTRODUCTION

This is the ninth in a series of reports describing operations of the NASA Aviation Safety Reporting System (ASRS) (refs. 1–8) under a Memorandum of Agreement signed on August 15, 1975 by the National Aeronautics and Space Administration and the Federal Aviation Administration.

This report contains two studies based on information contained in the ASRS database. The first is an analytic study of reports dealing with distractions in the air carrier operational environment. The second is a statistical summary of the ASRS database itself. A third section presents a sampling of alert bulletins disseminated by ASRS and of the responses to them.

*Battelle's Columbus Division, Mountain View, California 94043.

DISTRACTION – A HUMAN FACTOR IN AIR CARRIER HAZARD EVENTS

Capt. William P. Monan*

It has long been recognized by aviation safety workers that the attribution of an accident or incident to "pilot error" leaves unanswered the question of why the error was committed.

Working paper on *Human Factors in Aircraft Operations*
Ames Research Center, NASA

INTRODUCTION

To date, approximately 2500 voluntary reports involving air carrier scheduled operations have been submitted to the Aviation Safety Reporting System (ASRS). Since most reports to the ASRS narrate self-admitted errors, it is not surprising that the majority of airman incidents are classified by ASRS researchers as associated with one form or another of "pilot error."

In past years, when aviation specialists and the public believed in the myth of the pilot-hero, a semi-godlike figure with white scarf and Ray-Ban sunglasses that the aviation community itself created, classification of an event as pilot error would have been adequate explanation of probable cause. Our hero had failed, he was not expected to fail, he must not, will not fail again. That was usually the end of investigation.

The myth of the pilot-hero emerged from our own fears, our seat-in-the-cabin helplessness, and self-knowledge of our own human weaknesses. Because we trusted him with our lives in a dangerous environment, it was a natural step to build his image into a father-hero symbol endowed with superhuman qualities. Believing in such an image, how could we gracefully and publicly interrogate him about human limitations whenever he temporarily failed to perform infallibly? The failure of the image was cause enough to explain the accident.

This belief in a myth, the airman-hero, was probably a base for the psychological block that permitted acceptance of "pilot error" as the final analysis of an accident. Further, the hero myth has unduly delayed human factor research into unsafe or hazardous aviation occurrences.

The ASRS – which offers a unique opportunity to explore the "why" of a pilot error by supporting research into the identification and interrelationships of the coincidences comprising the well known "chain of events" always manifested in an unsafe aviation occurrence – has been used in studying several aspects of air carrier flight-crew performance. The basic integrity of the individual pilot, perhaps the most fundamental and important human factor element, is strongly evidenced in the tone and attitude of the written narratives in the reports. Admissions of error are offered without alibi or excuse. Often included is a searching, personal self-scrutiny for the real cause of the event. This search for truth, conducted without false pride or vanity, is and always has been the hallmark of the working professional airman.

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*Principal research scientist, on the staff of Battelle's Columbus Laboratories (BCL), assigned to BCL's ASRS project. He was formerly with an international air carrier, retired in April 1978 as regional director of flight operations.

Because all reports are unverified narratives of only "one side of the story," no attempt to place blame or criticism has been made by ASRS researchers. Reporter input and research output are learning experiences into the "why" and not the "who" in unsafe aviation occurrences.

One of the frequently occurring causes of hazardous events in air carrier operations is the human susceptibility to distractions. This report describes the study of this topic, carried out as one element in the series of air carrier human-factors investigations being conducted by the ASRS research group.

COCKPIT DISTRACTION: CAUSES AND TYPES

> **Distraction: that which draws the sight, mind or attention to a different object, or, confusingly attracts in different directions at once.**
>
> *Webster's Third International Dictionary*
> 1963 Edition

Confirmation of the frequency with which distractions occur in the cockpit is obtained by noting that distraction appeared more frequently than any other human factor in the ASRS data-base. A total of 169 distraction events were identified in the voluntary reports submitted by air carrier pilots.

The enabling or associated causes for those 169 occurrences fell into two distinct categories:

1. Nonflight operations activities consisting of company-required tasks, such as public address announcements, on/off blocks messages, logbook paperwork, and flight-service/passenger problems. Untimely cockpit conversations that interfered with airman duties were also classified in this category.

> We were climbing out of XYZ airport. The first officer was flying. I acknowledged a 7,000 ft restriction, then went back to my paperwork. I didn't see the F.O. set 17,000 in the altitude select window. As we passed 12,000, Center called, wanted to know where we were going . . . .

2. Flight operations tasks, internal to crew functioning, with the cause of distraction often noted in ASRS reports as "workload" or "excessive workload." These workloads consisted entirely of routine duties normal to every flight: running checklists, looking for traffic, communicating with ATC, handling minor malfunctions, avoiding buildups, and monitoring radar. An overlap of any combination of these tasks in a short time frequently triggered a distraction event.[1]

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[1] Air-carrier airmen, especially senior captains, may have some difficulty in accepting "distraction" as a cause of any pilot's failure to accomplish simultaneous routine flight tasks. One supervisory airman stated: "Doing two things at once is what we're paid for. If a crewman can't do it then he's a no-good pilot. He just can't do the job." A valid point, but the outline of the traditional pilot-hero myth shows through his words. To accept a summary judgment of competent/incompetent, good/no good for a single mistake due to workload would put us back into the same attribution of accident/incident due to "pilot error" without need for further investigation as to why the failure occurred.

> We were cleared to descend to 5,000. I was doing the approach checklist. Suddenly I saw the altimeter going through 4,200. Before I could do anything, a light airplane came over the top of us. We missed him by maybe 200 ft.

Both categories of distractions compromised safe flight operations in two separate ways:

1. An essential task was not accomplished. For example, failure to watch for traffic resulted in several near-miss incidents.

2. Crew coordination or crew management was seriously interrupted or eliminated. This loss of organized teamwork frequently led to crew inattention to flying the airplane with resultant deviation from a desired flightpath.

Thoughtful analysis of the causes of distraction resulted in recognition that cockpit priorities for routine task accomplishment followed consistent patterns. During "excessive workload" peaks, the checklists were always accomplished, radar monitoring continued, and minor malfunctions were handled. However, routine traffic watch and ATC communications (especially at tower hand-off) were apparently lower priority items and occasionally were not accomplished in time to avoid an unsafe occurrence.

In contrast, when a radar point-out of specific o'clock traffic, was made, then highest priority was apparently given to finding the other aircraft. The priority was often so overriding that crew management lapsed and cockpit coordination failed.

It was noted that most reported distraction events had definite interrelationships with the ATC system. It appears that operational distractions that do not affect ATC regulations either do not occur as frequently or are not as often reported to the ASRS system.

EFFECT OF DISTRACTION

If airliners were flown by only one pilot,[2] any airman distraction could easily result in another entry into the NTSB accident file. However, airline cockpits are manned by multiple-member crews that operate as a team under crew-concept and human-redundancy principles. Thus, any air carrier distraction report relating an unsafe occurrence leads the ASRS researcher toward consideration of cockpit coordination and crew management practices.

From the viewpoint of distraction events, analysis of the reports volunteered by the airmen indicate that crew management could be simplified into the accomplishment of two goals:

1. Timely and correct completion of a task or duty.

2. Adequate monitoring of or action to ensure aircraft maintenance of a desired flightpath.

---

[2] "During absence of the F/O from the flight deck, an airline captain misread his charts and deviated from route. He summarized the event: 'Single pilot operation has no normal safeguard with no second or third crew-member on the flight deck.' "

To achieve these goals, human engineering concepts have been applied to cockpit activities so that air carrier crews are trained not only to "fail safe" but to "fail operational." In the identical manner by which dual Category II autopilots monitor each other's electronic performance during an autoland maneuver, crew members, guided by crew-concept policies, monitor each other's performance, ready to restore normal operation if and when an error or out-of-limits excursion should occur.

If, due to distraction, one airman is removed from the operational loop, then a vital cross-checking function is eliminated. The operation becomes vulnerable to any error committed during "the one-man show." This mistake is more than a link in a chain of events; because it remains unchallenged, it becomes a moving hook probing forward in time, ready to combine with other pertinent coincidences.

If both pilots (or all three airmen) are distracted from monitoring or flying the aircraft, the airplane is in jeopardy. If the distraction is protracted, then the flight is in utmost peril.

> During the descent to our assigned altitude (7,000 ft) door warning light illuminated. Pilot and copilot attention was diverted to depressurizing the aircraft. My next instrument scan showed approximately 2,000 FPM descent passing through 6,000 ft. I immediately added full power and pitched up 25° and climbed at 4,000 FPM back up to 7,000 ft. As we climbed, another aircraft called and asked Center for our altitude. In writing this report I am not minimizing the error in crew coordination: I personally will review my cockpit procedures . . . .

Table 1 shows the subdivision as to type of the 169 air carrier distraction reports comprising the data base for this study.

TABLE 1.– TYPES OF REPORTED DISTRACTIONS

Type	Number
Nonoperational activities	
Paperwork	7
PA system	12
Conversation	9
Flight attendant	11
Company radio	16
Operational – flight workload tasks	
Checklist	22
Malfunctions	19
Traffic watch	16
ATC communications	6
Radar monitoring	12
Studying approach chart	14
Looking for airport	3
New first officer	10
Fatigue	10
Miscellaneous	2
	169

In addition to flying safely from "A" to "B," airline cockpit crews are expected to assume certain nonoperational responsibilities for the general well-being of their passengers. Crews also must do some "bookkeeping" for their employers: crew logs, engine logs, block/air times, and similar computer-form entries. Many of these minor tasks trigger company communication messages to the departure or arrival station.

Such company work tasks have long been recognized by airline management as potential distractions from more essential crew duties. Published policies attempt to eliminate such interruptions as the stewardess entering the cockpit to order a wheelchair just as the aircraft overheads the outer marker, or the chime of the interphone at top of descent: "What time are we arriving at so and so . . . ?"

A total of 55 ASRS reports dealt with cockpit distraction caused by disruptive activities not related directly to the operation of the aircraft.

"Paperwork" Task Distractions

> Nonessential paperwork should be delayed until the cruise segment of flight.
>
> Paperwork done on the flight deck during climb and descent should be limited to that which is essential . . . .
>
> *Air Carrier Flight Operations Policy*

In all "paperwork" distractions, the captain was the individual distracted from monitoring flightpath as flown by the first officer. All incidents resulted in altitude deviations from clearances, all intercepted by ATC radar challenges. Filling out logbooks, engine readings, on/off times, and perusing a sigmet chart were identified as the administrative tasks that caused significant distractions.

All incidents occurred either in climb or descent. It would appear that adherence to a rule of "no paperwork in climb or descent" would have prevented all of these distraction incidents.

From two reports: "I was digging in my briefcase for charts or copy of the filed clearance messages." In the first, the flying pilot climbed 1,000 ft above ATC assigned altitude. In the second, he started descent without ATC clearance with traffic below.

A typical airman report on "paperwork" distraction:

> We were cleared to 11,000 ft by departure control. Once the workload diminished I started to complete the logbook and time sheets, etc. The F/O was flying and the aircraft leveled off and picked up speed. As I finished the paperwork, Center called and asked our altitude. I then noticed it was 10,000 ft.

Public Address System Distractions

To minimize interference with cockpit duties in terminal areas avoid using the PA system below 10,000 ft.

Air Carrier Flight Operations Policy

The usual effect of public address (PA) system distractions was removal of the captain from the ATC communication loop. A misunderstood or misstated clearance altitude assignment by the first officer then continued unchallenged into an "altitude bust," usually interrogated through ATC radar monitoring. In some cases intracockpit miscommunications were made by the nonflying pilot setting the wrong altitude into the altitude select window.

In the instances of misinterpreted altitude clearance messages, there is rare mention of any clearance readback confirming the altitude change with ATC. Several reports detailed prolonged cockpit discussion as to the correctness of the clearance. Usually, an assumption was accepted that the questioner "must have missed" a transmission while using the PA system.

One PA event probably considerably aged an anxious ARTS III radar controller when an air carrier overshot his assigned flight level, FL 280, by 700 ft while head-on traffic converged at FL 290:

> The copilot was on the public address telling the passengers about our thunderstorm deviation. While climbing through FL 270, the no. 4 generator tripped off the line. I asked the F/E to monitor the fault panel: the problem turned out to be a GCU (Generator Control Unit) and a decision was made to operate the generator isolated.
>
> When I looked back at the instrument panel our altitude was 28,000. The autopilot was disconnected and a normal smooth level-off accomplished. The total excursion was approximately 700 ft.
>
> There is a great deal to be learned from this incident. The public address system is a great public relations tool but should never be used in climb or descent.

Conversation Distractions

Irrelevant conversation . . . diverts attention from essential duties. It has caused accidents. It must not be tolerated.

Air Carrier Flight Operations Policy

All cockpit conversations noted by the airmen were relevant, that is, they dealt with operational matters: fuel load, time to descents, engine malfunctions, etc. Weather was never noted as a factor. There were indications in several narratives that line-type instruction was being offered by the captain. Two incidents centered on distraction due to check-airmen discussions. It is interesting to note that when talking to each other, neither pilot was monitoring the aircraft path.

> I feel this happened because for 30 or 40 sec we basically were not flying the airplane. The copilot was listening to me and I was talking so we goofed. It was sure a reminder of how easy it is to be distracted . . . .

Seven of the nine conversation-distractions resulted in "altitude busts" – descending through assigned altitude or failing to level off after climb out.

Flight Attendant Distractions

Most of the flight service distractions came in the descent phase and involved flight attendant discussions with the captain about travel connections, cabin situations, and general passenger problems. Various errors resulted from this withdrawal of attention: misreading an altimeter by 10,000 ft, late descent, overshooting and undershooting altitude crossing restrictions, etc. Many of these procedural mistakes, however, seemed to involve intracrew communication failures. An amended clearance or new altitude assignment was "rogered" to ATC by one pilot but the information was not passed on nor understanding confirmed by the other pilot.

> Flight attendant discussing a cabin situation with captain. Clearance was received by first officer for flight to cross 15 DME at or below FL 230. Captain crossed 15 DME at 240. Previous cockpit coordination had been good. For some unknown reason F/O failed to mention correct altitude required . . . .
>
> The climb checklist was being accomplished and a flight attendant entered the cockpit for the captain's signature. Shortly thereafter, departure requested verifications of our altitude which was reported as 7,800 for 8,000. We were then advised that we were only cleared to 6,000 . . . .
>
> We were at FL 230 and told to descend as to cross ABC at 18,000. I hurried to fill out the engine readings. Just then a flight attendant came up front with a request for a wheelchair. Center asked us for our altitude. We were just west of ABC and still at FL 230. We had forgotten to descend . . . .

Company Radio Communication Distractions

Analysis of the 16 cockpit distractions caused by company communication tasks show that all except one (no landing clearance) resulted in altitude deviations from ATC assignments. However, only five of these were due to misunderstood ATC communications; nine were caused by flight errors in which the flying pilot (FP) "inadvertently" departed his altitude without being intercepted by the nonflying pilot (NFP) momentarily engaged in company transmissions. It is noteworthy that in six of the nine events, the NFP belatedly recognized the altitude deviation prior to ATC radar intervention. In five of these, the F/O was flying the plane (in the sixth incident the FP could not be identified). In two of these cases the error was rectified by crew request for altitude confirmation from ATC. In the four incidents of flight error in which the captain could be identified as the flying pilot, there were no challenges by the F/O. In one narrative the flight engineer was communicating with the company, the captain was busy on the PA system, and the F/O misunderstood an ATC assigned altitude while descending the aircraft. Four of the eight distractions occurred above 10,000 ft, outside terminal areas.

> We were coming into XYZ. We checked in with approach, told to expect ILS. While F/O was calling in range to the company I thought I understood Center to clear us down to 4,000, so I started down . . . .

Perhaps the most typical event caused by a combination of distractions is a captain's self-described "parabolic capture" of an assigned 10,000-ft altitude:

> We had a jump seat rider, the F/O was on the PA making the seat-belt announcement and one air conditioner pack had overtemped and I was manually adjusting same . . . .

He recommended the "removal of all second officer duties from two-man aircraft, that is, PA announcements, ATIS, paperwork, company radio calls, etc., etc., etc."

OPERATIONAL-TYPE DISTRACTIONS

Distractions that were internal to the crew were subtle and less readily identifiable than obvious external interruptions. These distractions were the outcomes of routine cockpit tasks or duties, which, when overlapped in a short time, resulted in the often used phrase: "excessive workload."

The tasks were routine but essential. Typical combinations narrated in the ASRS reports were: running a checklist while taxiing, during climb, or during approach; radar monitoring while changing altitudes; traffic watch at level-off; and ATC communications with weather avoidance. All are usual flight-crew functions on every flight. When accomplishment of several such duties merged into simultaneous activity through coincidence, poor planning, or urgency, then a "distraction-due-to-workload" event sometimes occurred. This distraction almost always ended in failure to monitor or to ensure the desired flightpath of the aircraft.

> We were cleared to descend to 5,000. I was doing the approach checklist. Suddenly I saw altimeter going through 4,200. Before I could do anything a light airplane came over the top of us, we missed him by 200 ft . . . .[3]

Distraction, through a routine task, eliminated the vital cross-check function of monitoring another crewman's error. The preoccupation of one pilot resulted in the classic "one-man show." As in most such events, the most insidious result of distraction is its effect on "crew management."

It is significant that only a few ASRS reports indicated that IFR conditions were pertinent factors in any distraction event. The typical airline simulator training envelope of solid IFR from lift-off to break-out was not duplicated in the "real world" of on-line distraction events. Only those reports that related avoidance of thunderheads, towering cumulus, or strong radar echoes had any reference to outside environment as distraction factors.

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[3] ASRS reports indicate that the plus-500-ft altitudes are critical traffic areas in avoiding "unknown VFR traffic" near terminal areas.

In the great majority of incidents, distraction was associated with a good-weather CAVU situation. It would appear that routine workloads were not only greater in a see-and-avoid, blue-sky world but far more dangerous due to the human factors limitations of flight crew members. As one controller stated: "You never see an altitude bust in bad weather." And a pilot reported: "Crews should be more attentive to detail, especially when the weather is good."

Checklist Distractions

Typical air carrier flight policies indicate that the timing of completing the checklist is critical in avoiding workload distractions.

> Taxiing the aircraft demands constant attention . . . delay reading the checklist until clear of congested areas.
>
> Complete the takeoff checklist when local area navigation and ATC requirements have been met.
>
> The approach checklist should be initiated . . . before terminal area factors compromise the use of the checklist.
>
> *Air Carrier Flight Operations Policies*

Twenty-two reports of distraction incidents associated with reading checklists have been submitted and are listed in table 2.

> We were cleared for an ILS approach and advised to contact the tower at the outer marker. At this time the crew became involved with checklists and inadvertently forgot to contact the tower prior to our landing.

TABLE 2.– CHECKLIST DISTRACTIONS

Phase of flight		Results	
Climb checklist	7	Altitude deviations	9
Descent checklist	6	No landing clearance	6
Landing checklist	6	Took another aircraft's clearance by mistake	2
Taxi checklist	3	Unauthorized entry into active runway	3
		Failure in see-and-avoid concept	2
Total	22	Total	22

An analysis of those 22 reports revealed two characteristics that were common to all the reports.

1. Every report indicated that checklist accomplishment received cockpit priority over ATC requirements. Every incident ended in a potential or actual violation of ATC rules or regulations.

2. The checklist activity was almost always going on at the same time other cockpit tasks were being performed: radar monitoring, minor malfunctions, systems operation, traffic watch, etc. Checklist accomplishment became a cause for distraction not by itself but as part of cockpit workload. In the incidents reported, the workload became "excessive" and "time ran out" before all tasks could be completed.

That airmen at least partly recognized the building workload is revealed in many narratives:

> We were somewhat busy running the checklist, monitoring the radar, etc. . . .

A near miss on approach at 2,500 ft was reported:

> The simplistic answer to this is "failed to see and avoid each other." A more realistic observation is that the crew was very busy with landing checklist, studying the approach and monitoring airspeed.

An altitude bust at 6,000 ft in climb-out:

> We had a light airplane and obtained a high rate of climb. Due to other distractions, that is, rechecking SID, looking outside for traffic, resetting climb power, completing after takeoff checklist, changing frequencies, and selecting radials, we inadvertently passed through our assigned altitude.

There is a sense of haste or rushing threaded through several of the checklist/workload distractions. An uncoordinated entry into the active runway caused a go-around and these words:

> We were extremely busy from start of taxi to the runway. Three frequencies, a checklist, physical movement of the aircraft. However, after the fact I realized we were rushing too much.

Table 3 shows the distribution of factors that were instrumental in ending the distractions caused by checklist procedures.

TABLE 3.– CHECKLIST DISTRACTION–
EVENT CHAIN BREAKERS

Chain broken by	Number of reports
ATC/radar intervention	9
Flight crew recognition	2
Flight crew evasive action	2
None	9
Total	22

It appears clear from the ASRS reports that checklist accomplishment, when combined with other flight crew tasks, becomes a specific factor in creating the well-known "excessive cockpit workload."

> During climbout from XYZ we were assigned 6,000 ft. At 5,000 the bell and light altitude reminder worked as planned. The 1,000-to-level call was made. Climb checklists were being completed, navaids tuned and identified, Center being reported to, and radar continuously monitored for isolated calls.
>
> The 6,000-ft altitude was missed . . . .

It is doubtful that a catastrophic engine failure at rotation is readily identified as a "distraction" by an air carrier pilot. Yet, by virtue of its power to divert a crew's attention from flying the airplane – keeping the aircraft precisely on a desired flightpath – any significant failure or malfunction qualities emphatically as a flight crew distraction.

The intensive and recurrent drilling on simulator maneuvers, such as the lost engine after V_1 or engine fire bell on takeoff, tends to emphasize procedural correctness while blurring the equally important management task of maintaining the aircraft on a proper trajectory. The airman who carries out the emergency procedures rapidly and exactly while the stall stick shaker is sounding will not only obtain a "U" grade but has demonstrated distraction from proper and adequate attentiveness to flying the airplane.

The disciplined response in avoiding overconcentration upon an emergency or a serious near-the-ground malfunction is apparently less emphasized in the handling of minor abnormalities at higher altitudes. Table 4 lists the 19 malfunction-distraction reports that were submitted to the ASRS system; none were emergencies, all were relatively minor in seriousness.

TABLE 4.– MALFUNCTION DISTRACTIONS

Type of malfunction	Number of reports	Results of distraction	Number of reports
Engine generator	4	Altitude deviation from clearance	12
Door warning	3	Deviation from route	3
Pressurization	2	No landing clearance	2
Duct overheat	2	Penetrated restricted airspace	1
Engine vibration	1	No deviations	1
Gear light	1		19
"Mechanical problem"	1		
Autopilot malfunction	1		
Smoke in cockpit	1		
Compass malfunction	1		
Anti-ice light malfunction	2		
	19		

Eighteen of the 19 distractions resulted in inadequate monitoring or control of the desired flightpath. "Cockpit management" and "crew coordination" were the descriptive terms applied by the diagnostic researchers to these reports.

The reason why one malfunction distraction (battery smoke) did not result in a cockpit management failure is evidenced by the reporter's recognition of the situation:

> The pilot flying is responsible for calling out the memory items. This is distracting and takes away from his primary job of flying the aircraft.

> It seems to me that it would be much better for one pilot to fly the aircraft and communicate to ATC while the other pilot and the F/E handle the emergency.

In five reports of altitude deviations it was mentioned that the autopilot was on. This suggested that crew awareness of instruments may be diminished when the autopilot is engaged, and that they feel free to engage in protracted troubleshooting of the systems problem.

One report summarized:

> Flight crews should be more aware (that) mechanical problems should not be allowed to divert attention from the primary task of flying the airplane, even though on autopilot at relatively high altitudes.

Malfunction distractions affected flight operations in two ways:

1. By distracting both (or all three) airmen, flightpath of the aircraft was unmonitored.

> While climbing we inadvertently exceeded the 6,000 crossing restriction at the VOR. The cause of this incident was crew attention diverted by an engine vibration problem. The first officer, who was flying, looked down at the throttles to determine which engine was vibrating while the captain and flight engineer were both looking at the AVMS (Airborne Vibration Monitoring System).

2. By distracting one pilot, the cross-monitoring backup function was eliminated and an error went unchallenged.

> While climbing through 270 (for FL 280) the S/O advised no. 4 generator had tripped off the line. I asked him to monitor the fault panel; a decision was made to operate the generator isolated. All of this took no more than a few seconds. Upon looking back at the instrument panel, our altitude was going through 28,000. Crossing traffic (at FL 290 was in sight). I disconnected the autopilot and leveled off at 28,700.

Table 5 shows how the 19 reports were distributed with respect to the pilot's behavior in response to the distracting malfunction. Table 6 shows what the "other pilot" did in the seven reports in which the malfunction-distraction disrupted the cross-monitoring backup function.

TABLE 5.– MALFUNCTION EVENTS – PILOT BEHAVIOR

Pilot behavior	Number of reports
Both pilots distracted by malfunction	9
One pilot distracted when other pilot makes error	7
Activity of other pilot not mentioned	3
Total	19

TABLE 6.– MALFUNCTION EVENTS – OTHER PILOT ACTIVITIES

Activities by "other pilot"	Number of reports
Misread SID	1
Misread profile descent	1
Clearance interpretation	1
Did not reset altimeter to 29.92 in climb	1
Overshot altitude	2
On PA system	1
Total	7

Fatigue due to long duty periods was noted as an associated factor during two malfunction occurrences. It was interesting to note that serious malfunctions or abnormalities did not trigger any distraction reports.

The most representative example of minor malfunction troubleshooting draws a disturbingly close parallel to a recent air carrier crash:

> We broke out in the clear at approximately FL 190 (cleared to 16,000) and immediately lowered the nose and accelerated to about 370 knots. Our rate of sink increased to 3,000–4,000 FPM. The no. 2 anti-ice light would not extinguish and therefore the crew began to troubleshoot the light. The noise level was high; we did not hear the altitude warning bell. Further, the altitude warning lights are difficult to see in daylight. The pilot at the controls was turning on/off the anti-ice switches. Additionally the pilot not flying the aircraft did not make the required call out of "1,000 ft to level-off." An altitude overshoot of 2,000 ft occurred before the captain noted the altimeter.

"Traffic at Twelve O'Clock" Distractions

"Traffic at twelve o'clock" is probably the most compelling distraction in the airline cockpit. It is an urgent alarm. The radar controller's point-out triggers the universal self-preservation instinct to avert imminent danger.

TABLE 7.– TRAFFIC WATCH DISTRACTIONS

Pilot actions	Number of reports
Both pilots looking	9
Only one pilot looking and other pilot otherwise occupied	7
Total	16

Sixteen "traffic watch" distractions were reported. It was significant that, as shown in table 7, in every event in which a specific target was specified by the controller the attention of both pilots was diverted from altitude awareness and management attention to aircraft progress. Table 8 depicts the results of the distractions reported; and table 9 details the resulting altitude deviations in 12 cases. In some cases, overshoot of an ATC assigned altitude carried

TABLE 8.– TRAFFIC WATCH DISTRACTION RESULTS

Distraction results	Number of reports
Altitude deviations from clearance	12
Near miss	1
Nonstabilized approach	1
No tower landing clearance	2
Total	16

TABLE 9.– ALTITUDE DEVIATIONS RESULTING FROM TRAFFIC WATCH DISTRACTIONS

Altitude deviation	Number of reports
In early climb phase	10
In late climb phase	1
In descent phase	1
Total	12

the aircraft closer to converging traffic. "We were looking . . ." was a common phrase in such reporter narratives.

> We were cleared to 8,000 ft, passing 6,000. Departure control advised there was VFR traffic at twelve o'clock, 4 miles. My copilot and I strained to see traffic but were unsuccessful. I asked for a vector away from traffic, was given a left turn. In the turn I observed I was passing through 8,700 ft. I busted my altitude. (1) Poor visibility. (2) Report of VFR traffic at twelve o'clock. (3) Target fixation, by both myself and copilot, being outside the aircraft so that altitude call out was missed and altitude scan inadequate to prevent exceeding 8,000 ft.

In contrast, a general traffic scan without specific radar targets resulted in attention of only one airman being drawn from aircraft monitoring Under these circumstances incidents took place when the other pilot either made a flight error or became preoccupied with other tasks: flying a complicated SID, looking at a weather chart, "doing his cockpit duties and radio work," etc. One nonflying pilot did make the "1,000-to-level off" call out but the flying pilot then misread his altimeter with a resultant altitude overshoot. The distribution of traffic watch conditions reflected in the 16 reports is shown in table 10.

TABLE 10.– TRAFFIC WATCH CONDITIONS

Condition	Number of reports
Both pilots looking	
Specified targets	9
Radar point-outs – nonspecific traffic watch	0
Only one pilot looking	
Specific radar point-outs	1[a]
General, nonspecific traffic watch	6

[a]New first officer mentioned.

Ironically, a radar point-out of specific aircraft traffic draws such complete and sometimes protracted crew attention that traffic scan is lost in other directions. Many flight deck truisms have been formulated from experience: "As soon as you see one aircraft, look in the other direction." "It isn't the one you are looking for that will hit you . . . ."

> An earlier traffic advisory had drawn the attention of the first and second officers toward one o'clock, when a westbound light aircraft passed over us from our nine o'clock position. The danger of midair collision remains in my opinion, the biggest hazard in my daily operations. Radar seems to generate a hazard when everyone tries

to spot traffic we have been advised about, which may be nowhere near our altitude, and traffic that doesn't show on radar may be approaching from another direction.

In two incidents associated with traffic monitoring, the setting of incorrect level-off altitudes into the altitude alert window was an associated factor in overshoots:

> The altitude alert was set for 5,000 ft prior to receiving the clearance (force of habit from experience with this field) .... As we climbed through 3,000 ft we were advised of traffic at one o'clock and at 3,600 ft. Both of us were looking for the other aircraft and consequently flew through (our assigned) 4,000 ft. Had 4,000 ft been set into the altitude alert we would have been subconsciously aware.

> Departure requested verification of our altitude which was reported as "out of 7,800" for 8,000 ft. We were then advised that we were only cleared to 6,000. The main factor contributing to this flight being at the wrong altitude was that the wrong altitude was set into the altitude reminder and not picked up by any of the crew members .... Other factors involved: Our increasing dependence on the altitude reminder which gives no signal that you did not set in the proper altitude. Also being in VFR conditions, the crew was looking aout for other aircraft rather than keeping their heads in the cockpit and being more aware of the altitude.

Although in many cases distraction resulted in the specific lookout task being accomplished with diminished management monitoring of the aircraft trajectory, the opposite situation also sometimes occurred. The consequences in those cases of inadequate traffic watch were usually far more serious than an altitude excursion.

> Captain and first officer eyes in cockpit in preparation for an approach to ABC airport. S/O making final adjustment to air conditioning and pressurization. When S/O looks out again, a light aircraft is 300 ft immediately in front of us at our altitude moving right to left. S/O calls out "little guy in front of us," captain increases nosedown attitude to pass under the light aircraft. Estimated miss about 50 ft.

> We were descending into XYZ, the first officer was flying, the autopilot was engaged. We were descending through 9,200 ft at 250 knots in a turn to the left as an aircraft came into view through the F/O's windshield. He disengaged the autopilot but used little or no control input because the other aircraft was behind us within about 2 sec of sighting. The F/O and I estimated vertical separation no more than 100 or 200 ft as it passed directly over the right side of our aircraft.

> F/O was climbing the aircraft. I was performing the after takeoff checklist when I felt a slight negative "G." A quick look at the altimeter showed we were going back through 4,200 ft. Then I saw aircraft B which almost filled the right windshield. It was so close that we could hear the engines. I would estimate B was at 4,500 ft and we went under him by about 200 ft. One cannot keep too much of a lookout for other traffic regardless of being on an IFR clearance.

One airman report noted that in pilot response to an ATC traffic advisory, the word "roger" was often routinely employed. He makes the important point that often controllers could interpret the "roger" as "traffic in sight" when in fact the traffic has not been sighted. He suggests strongly that AIM publication terminology be used to avoid ambiguous conveyance of such critical communications: "traffic in sight," "negative contact," or "desire vectors around traffic."

ATC Communication Distractions

Six distraction events associated with ATC communication requirements were reported. Other cockpit tasks always were linked with ATC communications in excessive workload situations. Five altitude overshoots ensued during low altitude climb-outs; there was one failure to obtain tower landing clearance. Other factors were: running a checklist, tuning navaids, and traffic watch.

Upon analysis, it appeared that the ATC communication messages to-from-to the aircraft were not the cause of reporter complaint as much as the ATC timing and message content (i.e., turns, amended clearances, vector headings, etc., occurring at level-off). One crew refused to respond to ATC.

> At lift-off, before gear was raised, ATC was again issuing traffic that was in our departure path. ATC called no less than two more times in the next 20 sec. This is not the time to be given traffic information.
>
> Altitude excursion through climb restriction on departing discovered by crew and shortly thereafter by ATC. Aircraft departed runway 27 with left turn to join airway, tower instructed us to change to Center frequency. On initial Center callup, they said to change transponder code; at this point communications broken up by another aircraft. The F/O said something and I felt a downward correction to proper altitude. Other factors: aircraft high rate of climb, cockpit duties, VFR conditions, checking for traffic, running climb check and changing frequencies, etc. . . .

Distraction Due to Approach Plate or Chart Reading

Fourteen distractions due to studying approach plates or terminal area charts during descent were submitted by aircarrier airmen. Nine altitude deviations (most were overshoots), three near misses, and one route deviation resulted from the "read-as-you-fly" technique.

Thirteen of the 14 incidents occurred at low altitudes (11,000 ft and below). One incident involved holding at 17,000 ft, with the captain flying, unable to locate the holding fix on his chart with a new first officer not being effectively utilized. The autopilot failed to hold and an altitude excursion resulted. The captain's final comment: "Frankly, the old man was overloaded."

There were some indications that complacency may have interfered with adequate preplanning in these kinds of distraction occurrences. One incident occurred during a profile descent when a pilot employed an out-of-date chart and the other airman looked at the wrong approach procedure. The explanation for the expired chart was that revisions had been issued only a week earlier and the short overnight layover had not permitted time to revise the manual.

Echoes of complacency might be found also in a pilot's need to study the approach as he descended because it was his "first trip after 3 weeks vacation." In a different report – "Neither pilot had been in the area in the last 90 days" – two captains flying together had their heads down when a light airplane passed 200 ft over their aircraft.

Five reports involved profile descents. One airman said about the procedure: "Too many heads down reading during a critical phase of descent. The fewer distractions the crew has during descent the safer the operation will be."

The three near-misses occurred as follows:

1. Air carrier at 10,200, slowing, captain looking at the approach chart. First officer took evasive action to miss small aircraft, same altitude, later reported as cruising at 9,500 VFR.

2. Air carrier descending to 2,500 ft, just extending flaps and gear, both pilots' attention in the cockpit when light aircraft "flashed over engine nacelle at less than 200 ft separation."

3. Air carrier descending, 7,500 ft just outside TCA boundary, "pilot reviewing approach plate"; first officer took evasive action to miss single engine light aircraft crossing in front of them.

One report ended: "We do not look outside the cockpit enough during near-airport operations."

Based on study of the report narratives, distraction through approach plate/chart review does not tend to combine with other tasks or duties. Apparently it is seldom a function of cockpit workload and appears to be a short interval lapse in cockpit management and crew coordination.

Weather Avoidance

Distraction due to over-attentiveness to the avoidance of towering buildups, thunderstorms, and turbulence were classified into two categories:

1. Attentiveness outside the aircraft, visually diverting around buildups (six events)

2. Attentiveness to radar monitoring inside the aircraft (six events)

A controller's report gives the radar observer viewpoint of an altitude excursion during weather diversion:

> Airline aircraft A diverted around weather inbound to XYZ. Aircraft was instructed to maintain 12,000, pilot acknowledged. Several moments later aircraft A was observed descending. Pilot concurred, through 11,500 and on collision course with airline aircraft B level at 11,000. Immediate evasive instructions were issued to aircraft A to avoid a midair. Estimated distance, when evasive turn was completed, between aircraft was 2 miles. Aircraft A appeared to also make an abrupt climb maneuver after being made aware of danger. In one scan of radar, aircraft climbed from 11,300 to 12,000. Using ARTS II readout.

Several airman reports of weather avoidance expressed some puzzlement as to why the radar controller had to be convinced of their need for diverting. The design of ground radar inhibits "painting" some of the buildup activity able to be displayed on cockpit radar readouts.

"We were dodging thunderstorms"; "We were momentarily attentive to outside weather"; and "We were distracted from the cockpit to the elements" were airman phrases relating distraction from altitude awareness.

The six visual avoidance events resulted in six altitude overshoots. Over reliance on auto-capture of level-off by the autopilot was related in one of these reports.

Although visual dodging of thunderstorms was not associated in the reports with other cockpit activities, radar monitoring did combine with other tasks in creating an overload. Checklists, navaid tuning, ATC communications, and fatigue were listed in various reports. All six narratives noted presence of "thunderstorm activity." Two deviations around weather ended in ATC interventions or off-course excursions, and four distractions resulted in altitude deviations.

The workload partially caused by buildups is narrated in one report:

> Climb checklists were being completed, navaid tuned and identified, Center being reported to and radar being continuously monitored . . . the 6,000-ft altitude was missed.

New First Officer Distractions

By adding to cockpit workload, an inexperienced first officer may disturb normal crew management functioning. Monitoring or instructing the first officer may distract the captain from accomplishing his normal duties. In reverse, a captain may be occupied in a routine task and fail to catch any mistakes brought about by inexperience or unfamiliarity with route, equipment, or procedures.

> It appears to be a simple case of too much confidence in a new copilot who simply hasn't enough line flying after many years in the engineer seat. I was distracted by rechecking ILS identification, calling the tower, etc., and did not catch the error as quickly as I should have.
>
> I was discussing descent techniques with a new first officer during a line training flight. We overshot our descent clearance; the radar controller intervened.

Ten reports associated with new first officers were classified as shown in table 11.

"Looking for Airport" Distractions

Three air carrier reports indicated that overattention to locating the airport or runway could distract crewmen from required tasks. Results of the three reported events were: (1) near miss,

TABLE 11.– DISTRACTIONS ASSOCIATED WITH NEW FIRST OFFICERS

Captain's activity	New first officer activity	Result
Duct overheat	1 Flying aircraft	Altitude overshot
Radio tuning	1 Flying aircraft	High airspeed and low at LOM
On-line training discussion	1 Flying aircraft	Altitude overshot
Company radio	1 Flying aircraft	Altitude overshot
Traffic watch	2 Captain not mentioned	Altitude overshot
Checklist	1 Flying aircraft	Engine overtemp
Taxiing aircraft	2 Unfamiliar with airport	Taxiied to wrong runway
Flying/holding pattern chart reading	1 Not mentioned	Altitude deviation

(2) deviation from assigned altitude, and (3) during restricted visibility, overshot ILS localizer with parallel ILS approaches in progress.

TABLE 12.– DISTRACTION EVENTS ASSOCIATED WITH CREW FATIGUE

Event	Number of reports
Altitude deviations	6
Approach to wrong airport	1
Route deviations	2
Misread chart	1
Total	10

Fatigue Distractions

Although fatigue is not itself a distraction it increases the airmen's vulnerability to distractions. As a human factor, fatigue is listed in ten events which are summarized in table 12.

The work/rest cycle is highlighted by various comments: "Seventh approach today"; "On duty seven days in a row"; "Eight landings in 8-1/2 hr flight time"; "Eight landings with three instrument approaches in thunderstorm activity."

Miscellaneous Distractions

Several occurrences could not be easily categorized. For example, this cryptic report:

> Cleared to 12,000 ft but went below altitude due to inattention and irrelevant cross-talk between us and Center caused by unprofessional conduct in the cockpit.

Or this unusual schedule maneuver:

> While performing a pitch trim runaway exercise we overshot our assigned altitude FL 280. Center told us of traffic at twelve o'clock (at 290); after we leveled at our assigned altitude we considered the incident uneventful.

Several reported distraction events could not be classified due to lack of sufficient detail. For example:

> F/O was flying, I acknowledged the descent clearance to 7,000 ft at which time I was momentarily distracted. We were level at 6,000 when ATC queried our altitude. I advised we were at 6,000 but should be at 7,000 . . . .

SUMMARY AND CONCLUSIONS

This human factor study of air carrier pilot distractions emerged from the relative frequency of one phrase "we were distracted by . . ." in numerous airmen reports to the ASRS system. In many cases the sentence was completed by the mention of a routine and ordinary cockpit task.

Implicit in the narrative was airman recognition that by "distraction" was meant attention diverted from management of the aircraft, especially the maintenance and control of a desired flight-path. There seemed to be general puzzlement as to why, on a particular flight, at a particular time, accomplishment of usual cockpit tasks suddenly and unexpectedly ended in near-disaster.

Though distraction, as a human factor, cannot be eliminated from the cockpit, the identification and type-classification of distraction incidents suggest possible improved means and techniques for minimizing causes of distraction and also for assisting in maintenance of basic concepts in cockpit management and crew coordination. This is important because distraction is not merely a cause of individual error: more critically, it impairs crew concept fundamentals which have been "human engineered" to protect against the errors that crew members will inevitably commit.

Distraction is as likely to happen during ground operation as in flight. Schedule pressure combined with taxi checklists, wing-tip clearances and ATC radio transmissions can result in unauthorized and potentially dangerous crossings and entries into active runways.

Causes for nonoperational distractions may be minimized through continued emphasis on cockpit priorities during climb and descent. Although PA announcements, logbook entries, and company radio on/off messages may fit into the overall cockpit workload, the crew backup in confirming correct ATC clearances and altitude adherence may be temporarily lost.

"Altitude busts" due to misreading profile descent charts may be reduced by format changes in boldly highlighting DME distances as associated with crossing altitude restrictions. The inclusion of several different runway procedures on a single page also has led to altitude excursions during profile "read-as-you-fly" descents.

Effects of distraction might be diminished if pilots were cautioned in their early "guessing" as to the ATC clearance altitude to be received. Pretakeoff selection of an ATC altitude that results in missetting the correct altitude reminder is linked with distraction into typical overshoots. The added trap in this error is that a lower altitude restriction is usually due to traffic at the normally expected level.

Although the convention is that "one pilot flies the airplane," the distinction may become obscured when the aircraft is under control of the autopilot. Both pilots tend to become vulnerable to any distraction. Auto-capture of level-off must be monitored.

During a distraction event, individual pilot misunderstanding or misinterpretation of an ATC clearance led to numerous altitude deviations. Emphasis should be made on two crewmen monitoring and cross-checking ATC clearance messages. Conversely, ATC controllers should be reminded of the importance of listening for the correctness of clearance readbacks.

The ASRS system records an average of two air carrier potential conflicts every day within U.S. airspace. There should be recognition that traffic watch is a "must" requirement that should be accomplished without detracting from crew management of the aircraft's desired path. There is a real and understandable temptation for all eyes to rivet attention to the outside world when flight conditions are CAVU and "traffic at twelve o'clock" has been called. Training is suggested in crew concept application covering flight control associated with traffic advisories.

Air carrier flight standards may deem it advisable to ensure that crew coordination principles are applied in such "real-life," on-line distractions as weather avoidance, radar monitoring, and minor system abnormalities during climb/descent phases of flight.

Numerous airmen reports registered chagrin and unease at a radar controller's failure to target all converging small aircraft traffic. Limitations of a fully automated RDP mode radarscope are not well known. Further, flight crews seem to be unaware that ground radar does not "paint" the same cloud buildups and thunderstorm cells that they are trying to avoid.

Distraction is most critical at:

- Ground level to 3,000 ft
- The 10,000–11,000-ft level
- The plus-500-ft altitudes occupied by VFR traffic skirting the edges of TCA airspace

The distraction-due-workload could be reduced and cockpit vigilance increased if low altitude level-off restrictions and heading changes could be minimized during air carrier SID climb-outs. Noise abatement procedures already increase the cockpit workload by requiring precision flying during airspeed changes, power reductions, sharp turns, and altitude and configuration changes; these maneuvers, added to ATC required altitude level-offs, seriously affect the see-and-avoid concept. One airman stated it concisely:

> We need fewer assigned headings during departure. Constant heading and altitude assignments in climb diverts crew attention to inside the cockpit. It forces one crewman to answer the radio instead of monitoring the other pilot's performance and keeping a visual watch.

Perhaps the ultimate expression in stating the hazard significance of cockpit distraction is from this ATC controller's report:

> The two aircraft should never have gotten together if my clearance had been followed. The next time I looked at the radar I observed the 0300 code converging with aircraft B, with both altitude readouts at 8,000 ft. At 1218 the two targets merged . . . .

A SUMMARY OF THE CHARACTERISTICS OF THE ASRS DATABASE

D. W. Hall* and A. W. Hecht*

INTRODUCTION

After 33 months of ASRS program operation, a total of 12,454 reports had been analyzed, processed, and their safety-related information content entered in the computer files that comprise the ASRS system's database. The distribution of attributes among this collection of occurrence and situation descriptions is interesting and, in many cases, highly significant. The following discussions describe many of these attribute distributions and point out their possible relation to matters of aviation safety.

MONTHLY REPORT VOLUME

All reports in the ASRS database are correlated to the month in which incidents occurred. The total† entered by the end of the twelfth quarter (eleventh quarter of database operation) represented an average monthly entry of 388.7 reports with a standard deviation of 75.9 reports. Statistical tests of these data have shown that there is no significant overall trend although month-to-month variations have been substantial.

Figure 1 is a graphical presentation of the distribution by report month.

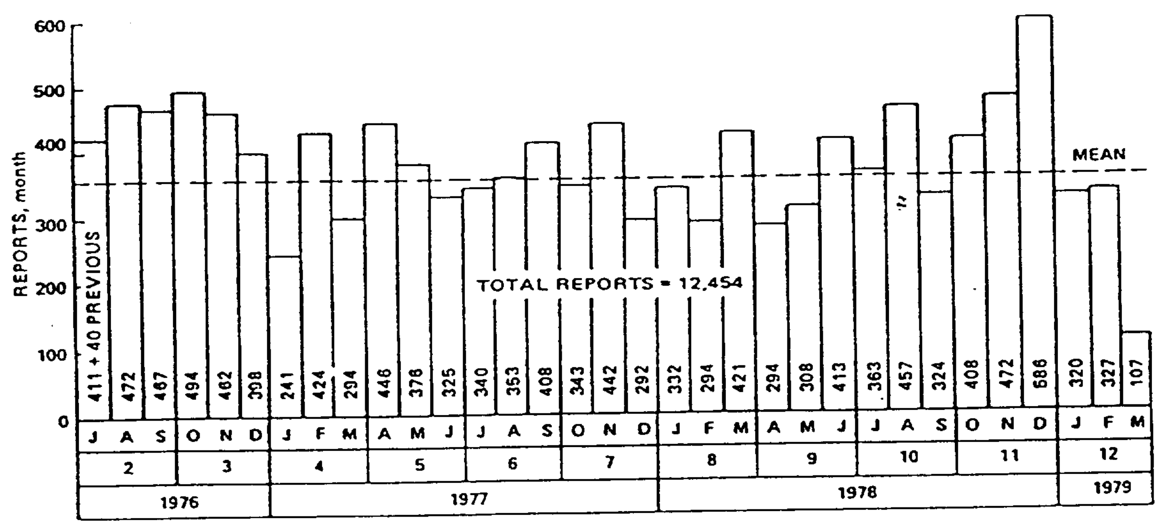

Figure 1.– Monthly report volume.

*Aviation safety researchers, Battelle Columbus Laboratories' on-site ASRS analysis team; Hall is operations supervisor (of database development activities) and Hecht is air carrier human factor researcher.

†The statistical dimensions quoted were based on report intake from July 1976 through December 1978; the reports from the first quarter of 1979 were not fully processed at the time this statistical summary was conducted and written.

Pilots submitted 48% of the reports received through March 31, 1979, and air traffic controllers submitted 44%. Table 13 presents the additional classification of "participants" for the 4,000 most recent reports. Note that ASRS report "participants" include all parties, not just the reporter, mentioned in any given report narrative. Tables 14 and 15 elaborate further on reporter qualifications by showing flight hours for pilots and years of experience for controllers. Not all reporters chose to provide this information. Of 12,414 reports in the ASRS database as of March 31, 1979, only 1% were anonymous. Of the 5,929 pilots reporting, 5,162, or 87%, chose to provide their flight hours; 5,027, or 85%, chose to provide their flight time during the 90 days prior to their reports. Of the 5,499 controllers reporting, less than 1% mentioned their experience, but our reporting form does not provide space explicitly for that entry.

TABLE 13.– CLASSIFICATION OF PARTICIPANTS

Classification	Reports, percent	
Pilots		(36)
Student	<1	
Private	8	
Commercial and/or instrument	2	
Instructor	1	
Air transport	20	
Military	5	
Other	<1	
Controllers		(37)
Radar	28	
Nonradar	8	
Developmental	1	
Not specified	–	
Flight service specialist		1
Crew member		4
Passenger		<1
Observer		<1
Unknown		22
Total		100

TABLE 14.– FLIGHT EXPERIENCE OF REPORTING PILOTS

Reported flight time, hr	Pilots reporting, percent
Total flight time	
0–3000	30
>3000	70
Total	100
Recent flight time (90 days)	
0–75	27
>75	73
Total	100

TABLE 15.– EXPERIENCE OF REPORTING CONTROLLERS[a]

Reported experience, yr	Controllers reporting, percent
1–10	33
10–20	28
>30	26
Total	100

[a]As pointed out earlier, experience was given by only a small number of reporting controllers; table 15 is a breakdown of this small segment of reporters.

CALLBACK ACTION

ASRS analysts attempted to contact reporters for additional information in 16% of the incidents. About 11% of the attempts were successful; letters were used to contact 1% who could not be reached by telephone. Table 16 presents a summary of these data.

TABLE 16.– FREQUENCY OF CALLBACKS TO REPORTERS

Type of callback	Reports, percent
Not tried	83
Tried and completed	11
Tried but not completed[a]	5
Other	1
Total	100

[a]The effort to complete certain calls was discontinued after 5 days in the interest of de-identifying reports in a reasonable time period.

HANDLING PRIORITY

Analysts handled 95% of the reports in the database on a routine bases. In the remaining 5%, analysts submitted Alert Bulletin (AB) recommendations to NASA; 80% of the recommendations resulted in the issuance of an AB.

CHARACTERISTICS OF OCCURRENCES

Problems Discussed in ASRS Reports

In previous quarterly reports (ref. 2) we described the use of problem codes to categorize ASRS reports; although these codes are only general descriptors, they are useful as a means of focusing attention on certain problem categories. Data on the distribution of reported occurrences among the problem codes during eleven quarters of the ASRS program appear in table 17.

Types of Operations

Flight operation types are summarized in table 18. This information is incomplete in one sense because reports involving multiple aircraft (e.g., near midair collision reports) often contained only the operational category of the aircraft known to the reporter.

Most military reports received to date have been provided to ASRS through the cooperation of the USAF Directorate of Aerospace Safety and The Naval Safety Center. Both organizations routinely forward their reports to ASRS when the reports concern an interface problem between military and civil operations. These reports have been extremely helpful, as have the services' comments on Alert Bulletins describing certain interface problems.

When reviewing these data please note that the reporter is often aware of the involvement of a second aircraft, but does not know details such as those shown above and in table 19 (aircraft types) and table 20 (number of engines). Reports containing multiple aircraft are frequent. Of 10,959 reports in the ASRS database that mention aircraft, 6,962, or 64%, concern more than one aircraft (all 12,454 reports used in this study are summarized in table 21). In 3% of the reports

TABLE 17.– DISTRIBUTION OF ASRS REPORTS BY PROBLEM CODE

Problem code		Reports received, percent
ATC	(air traffic control function)	40
FLC	(flight crew function)	37
NAV	(air or surface navigation or communications equipment or facility)	6
ACF	(aircraft structure or subsystem	3
APT	(airport and subsystems)	5
PUB	(publications and procedures)	2
NMA	(potential conflict between aircraft, not assignable to ATC or FLC categories[a]	3
ACC	(aircraft accident)[a]	1
OTH	(all other classes of problems)	3
	Total	100

[a]These codes were discontinued in October 1976 upon realization that they were not problem areas but, rather, specific occurrence outcomes. Virtually all early reports falling in these categories would have been classified as either ATC or FLC.

TABLE 18.– TYPES OF OPERATIONS IN OCCURRENCE REPORTS

User category	Reports received, percent
Scheduled air carrier Supplemental air carrier	46
Air taxi Charter operations	7
Utility flying Agricultural operations	2
Corporate aviation Personal business flying	13
Pleasure flying Training, all types	16
Armed forces Government, other, and unknown	16
Total	100

TABLE 19.– AIRCRAFT TYPES IN ASRS REPORTS

Type of aircraft	Reports received, percent
Small aircraft, <12,500 lb	42
Medium transport, 12,500–100,000 lb Heavy transport, 100,000–300,000 lb Wide-body transport, >300,000 lb	46
Military aircraft, all types	11
Other aircraft	1
Total	100

TABLE 20.– NUMBER OF ENGINES

Number of engines	Reports received, percent
0	<1
1	28
2	43
3	20
≥4	9
Total	100

TABLE 21.– NUMBER OF AIRCRAFT INVOLVED IN INDIVIDUAL ASRS REPORT OCCURRENCES

Number of aircraft	Reports, percent
0	12
1	32
2	52
3	3
≥4	1
Total	100

mentioning other aircraft, the type is not known (those types known are presented in table 19) and in 7% of the reports mentioning aircraft, the number of engines is not known (data known are presented in table 20 for this parameter).

Environment Involved

Table 22, a summary of flight conditions reported, shows that VMC prevailed in most cases. The predominance of IFR flight plans filed (table 23) seems inconsistent with this finding. The inconsistency is explained by reference to table 18 which shows a predominance of reports concerning air carrier operations in which IFR flight plans are required. It is interesting to note that some type of flight plan had been filed in 89% of the flights described in ASRS reports. This may be

TABLE 22.– FLIGHT CONDITIONS

Flight conditions	Reports received, percent
Visual meteorological conditions (VMC)	75
Instrument meteorological conditions (IMC)	19
Unknown	2
Marginal	<1
Mixed	4
Total	100

TABLE 23.– FLIGHT PLANS FILED

Type of flight plan	Reports received, percent
Instrument flight rules (IFR)	73
Visual flight rules (VFR)	16
DVFR or SVFR	<1
No flight plan	10
Unknown	1
Total	100

indicative of a low level of participation in the system by those general aviation pilots who frequently do not file flight plans.

Other environmental attributes of reported occurrences are summarized in table 24 (ceilings), table 25 (visibilities), table 26 (lighting conditions), and table 27 (special weather factors). Not all ASRS reports contain references to environmental factors present in the occurrences being reported. Reporters indicate that in 77% of the 4,000 most recent reports weather was not a factor. Of those reports in which weather was cited as a factor, specific weather problems were mentioned in 96% of the occurrences. Those specific weather-related problems are summarized in table 27.

Table 28 presents lighting conditions in somewhat greater detail, by breaking a day into quarters. Table 29 presents reported incidents by day of week. These data, again, are based on the

TABLE 24.– CEILINGS[a]

Ceilings, ft (agl)	Reports, percent
0–1000	50
1001–3000	38
3001–6000	11
6001–10000	1
Total	100

[a]Ceiling and visibility data are not specifically requested on report forms. Tables 24 and 25 cover only those reports for which such information was volunteered. Where ceilings and/or visibilities were limited or not significant, as was the case in most of the reports, the values were usually not mentioned.

TABLE 25.– VISIBILITIES[a]

Visibilities, n. mi.	Reports, percent
0.0–0.5	15
0.6–1.0	11
1.1–3.0	39
3.1–5.0	14
5.1–10.0	9
10.1–100.0	12
Total	100

[a]Ceiling and visibility data are not specifically requested on report forms. Tables 24 and 25 cover only those reports for which such information was volunteered. Where ceilings and/or visibilities were limited or not significant, as was the case in most of the reports, the values were usuallv not mentioned.

TABLE 26.– LIGHT CONDITIONS DURING OCCURRENCES

Light conditions	Reports received, percent
Daylight	78
Applicable to various light conditions[a]	1
Nighttime	14
Dawn and dusk	7
Total	100

[a]Includes two or more of the possible choices appearing on the ASRS report form.

TABLE 27.– WEATHER FACTORS IN ASRS REPORTS

Weather factor	Reports received, percent
Precipitation	24
Thunderstorm	13
Turbulence	7
Haze, fog, smoke, smog	25
Ice	2
Snow	5
Other	24
Total	100

TABLE 28.– TIME OF DAY

Time period	Reports, percent
0001–0600	2
0601–1200	30
1201–1800	44
1801–2400	19
Unspecified	5
Total	100

TABLE 29.– DAY OF WEEK

Day of week	Reports, percent
Monday	14
Tuesday	14
Wednesday	15
Thursday	14
Friday	15
Saturday	11
Sunday	12
Unspecified	5
Total	100

TABLE 30.– ALTITUDES OF REPORTED OCCURRENCES

Altitude of occurrence, ft (msl)	Reports, percent
<1,000[a]	26
1,001–10,000	52
10,001–18,000	10
18,001–30,000	7
30,001–50,000	5
>50,000	<1
Total	100

[a]Includes incidents taking place on airports.

4,000 most recent reports in the ASRS database. Note the generally even distribution of occurrences reported during the week; a smaller number of reported events occur on weekends.

Finally, the altitudes at which incidents occurred are shown in table 30; the same data are plotted in figure 2. Figure 3 is a plot of altitude distribution of all reported occurrences, but based on incidents occurring within 1,000-ft-altitude increments.

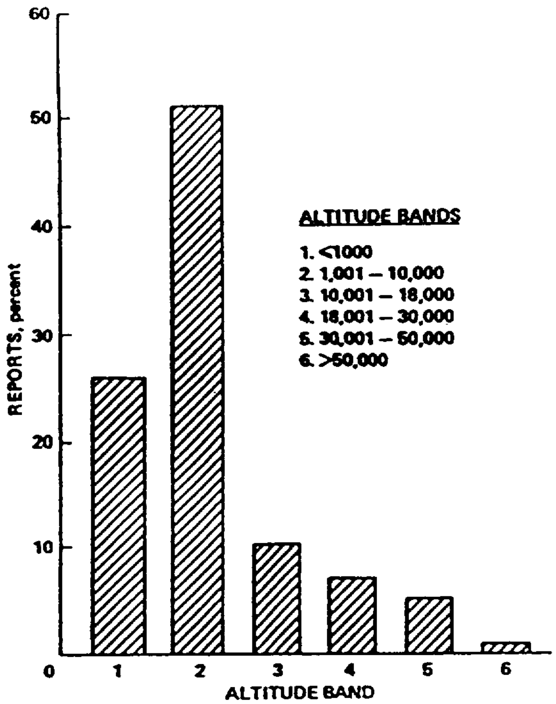

Figure 2.— Altitude distribution of occurrences by altitude band (ft, MSL).

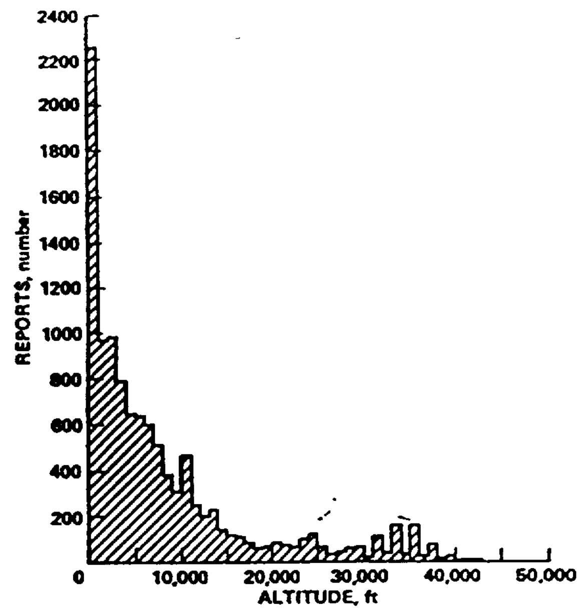

Figure 3.— Frequency of occurrence within 1000-ft (MSL) altitude increments.

Geographic Locations of Occurrences

The geographic locations of occurrences, by state, that led to ASRS reports during the preceding 2-3/4 yr of this project are summarized in table 31 and are mapped in figure 4. For the most part, the distribution reflects those states with high general aviation and air carrier aviation activity.

TABLE 31.– ALL REPORTS BY STATE

California	1640	Puerto Rico	201	Utah	86
New York	1013	Minnesota	192	South Carolina	80
Texas	890	Tennessee	185	Nebraska	75
Florida	712	North Carolina	172	Mississippi	72
Illinois	677	New Jersey	161	Iowa	62
Georgia	551	Oregon	152	Foreign	60
Ohio	517	Hawaii	150	West Virginia	60
Pennsylvania	587	Oklahoma	147	Connecticut	56
Colorado	427	Kentucky	146	Maine	29
Alaska	414	Wisconsin	138	New Hampshire	29
Indiana	383	Arkansas	134	North Dakota	29
Missouri	336	Maryland	133	Idaho	28
Arizona	322	New Mexico	115	Delaware	26
District of Columbia	308	Nevada	111	South Dakota	25
Michigan	244	Kansas	107	Rhode Island	24
Virginia	222	Louisiana	102	Vermont	24
Massachusetts	218	Virgin Islands	95	Wyoming	23
Washington	217	Alabama	89	Montana	22

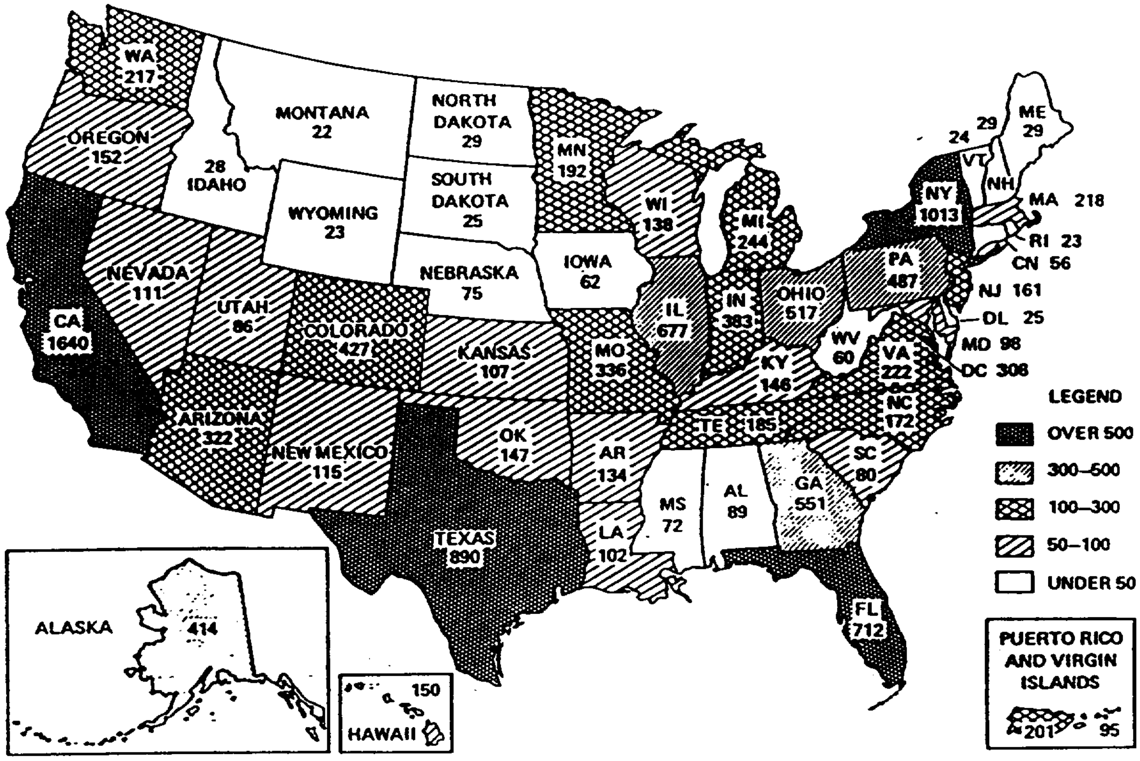

Figure 4.– ASRS reports by state.

Airspace

Table 32 lists the categories of airspace within which occurrences were described. It is worthy of note that almost three-fourths of all reports involved controlled airspace (airspace within which some or all aircraft may be subject to either enroute or terminal area air traffic control).

Air Traffic Control

The type of air traffic control that was being exercised at the time of reported occurrences is shown in table 33. It should be remembered that this tabulation in no way suggests that these control facilities were involved in the occurrences reported; on the contrary, some reporters expressed gratitude to controllers who assisted them during a mechanical or operational problem. The table does point out, however, that the preponderance of ASRS reports is coming from pilots who are in contact with the air traffic control system and who are, in more than half the cases, being controlled by it. The first category in table 33, ATC Centers, is outlined more fully in table 34.

Phase of Flight

The phase of flight during which occurrences were noted is shown in table 35. Seven percent of the reports described situations that reporters felt were of general applicability. It is noteworthy

that the largest fraction of reports concerned occurrences during cruise, whereas accidents are most frequent during landing and takeoff.

TABLE 32.– FAA AIRSPACE JURISDICTION DURING REPORTED OCCURRENCES

Type of airspace	Rank	Reports, percent
Airport traffic area	1	32
On airways	2	22
Terminal control areas (TCA or TRSA)	3	19
Applicable to various types of airspace[a]	4	11
Positive control airspace	5	11
Uncontrolled	6	5
Total		100

[a]Includes two or more of the possible choices appearing on the ASRS report form.

TABLE 33.– AIR TRAFFIC CONTROL DURING OCCURRENCES REPORTED TO ASRS

Controlling facility	Reports, percent
ARTCC (center)	32
Approach control	18
Tower (local control)	35
Report applicable to various ATC facilities and functions[a]	2
Departure control	8
Ground control	1
Flight service station	3
Unicom/multicom	<1
Company radio	1
Total	100

[a]Includes two or more of the choices appearing on the ASRS report form.

TABLE 34.– ATC CENTER INVOLVEMENT

Reports involving Centers	Reports, percent	Reports involving Centers	Reports, percent
Agana	<1	Los Angeles	7
Albuquerque	2	Memphis	2
Anchorage	6	Miami	5
Atlanta	5	Minneapolis	2
Balboa	1	New York	9
Boston	2	Oakland	4
Chicago	8	Salt Lake City	<1
Cleveland	5	San Juan	5
Denver	4	Seattle	3
Fort Worth	5	Toronto	<1
Honolulu	<1	Vancouver	<1
Houston	5	Washington	6
Indianapolis	7		
Jacksonville	4	Total	100
Kansas City	3		

TABLE 35.– REPORTED OCCURRENCES BY FLIGHT PHASE

Flight phase	Reports, percent
Cruise	21
Climb	17
Approach	16
Descent	13
Landing	8
Holding, traffic pattern, missed approach, other	8
Takeoff	7
Applicable to various flight phases[a]	7
Preflight	3
Total	100

[a]Includes two or more of the possible choices appearing on the ASRS report form.

SUMMARY

This study has described the sources of ASRS reports and some of the types of information contained in the Aviation Safety Reporting System's database. Future studies will elaborate on many of these areas and will also discuss those changes taking place over time in the database that reflect trends in the National Aviation System.

ALERT BULLETINS

Introduction

The Alert Bulletin (AB) process is one of the principal means by which the ASRS focuses timely attention on possible problems reported by the aviation community. As in previous ASRS quarterly reports, examples of Alert Bulletins are included in this report because Alert Bulletins and the responses to them often reveal information that can be put to good use by persons and organizations concerned with the National Aviation System. The following examples have been categorized into seven general classifications to assist the reader in locating Alert Bulletins that may be of special interest.

Flight Operations

1. Text of AB: Various locations: The explanation for "Expect Approach Clearance (Time)/EAC" as defined in the *Pilot/Controller Glossary* of the AIM does not agree with the provisions for "expected approach clearance time" as set forth in both the AIM, part 1 section of *Emergency Procedures – Two-way Radio Communications Failure*, paragraph 1C(3), page 1–81, or FAR Part 91.127(c)(4). Since, according to the Glossary, an EAC can only be ". . . issued when the aircraft clearance limit is a designated Initial, Intermediate, or Final Approach Fix . . ." there is no need for the aircraft to depart the holding fix earlier than the EAC as required by both FAR Part 91.127(c)(4) and pages 1–81 of the AIM.

Text of FAA Response: FAR 91.127 is presently being reviewed in its entirety. The objective is to revise the rule to reflect the present state of the art of both airborne and ground-based equipment. EAC procedures are being revised, and coordination is already in progress to reconcile the publications and simplify the procedures. AIM will be revised to reflect these changes.

* * *

2. Text of AB: Washington, D.C. National Airport: An airline pilot reports temporary geographic disorientation, at night, on climb out from runway 36 at Washington National Airport while using noise abatement procedures. Pilot mistakenly thought the unlighted Rock Creek Park was the river and proceeded to follow the wrong path toward P56. Contributing factors were high deck angle, high cockpit workload which distracted from following visual cues.

Pilot recommended considering the use of the 326° radial for northwest departures at night as well as under IMC conditions.

Text of FAA Response: The described noise abatement procedure has been in use since 1966. Jet aircraft are required to visually follow the river to the Georgetown Reservoir about 4 miles northwest of the airport. Then they either continue following the river or fly the Washington 326 radial to the 10-mile DME. However, when the weather is less than ceiling 3,000 ft or visibility less than 3 miles, aircraft are cleared to fly the 326 radial from departure. When weather permits, use of these procedures avoid overflights of Rosslyn/Arlington, as extremely noise sensitive areas.

This is the first such report received on the Washington National procedure nor is there any evidence that a similar problem exists at the many other airports using departure procedures predicated on visual references. We will be alert for reported recurrences but do not intend to change the procedure, based on this report.

* * *

3. Text of AB: Ketchikan, AK, Ketchikan International Airport: It is reported that takeoffs and landings on ramps and taxiways at KTN are being conducted on a routine basis and without apparent regard to traffic direction or runway in use by other aircraft. The reporter indicates that this situation's hazard potential is enhanced (1) during periods of restricted visibility – particularly when the sun is low, (2) by ground vehicles on the ramps and taxiways, and (3) by the proximity of a seaplane operating area.

Text of Airport Manager's Response: I do not like to restrict all taxiway operations, but recognize the problems we could encounter.

I have written a memorandum to the Flight Service Station advising them of my requirements and have initiated a letter of agreement that will be required to operate from the taxiway.

If these measures do not correct the situation, the taxiway will be closed to all takeoffs and landings.

Text of State Aviation Agency's Response: Thank you for bringing the ASRS Alert Bulletin to our attention. The airport manager advises that he will be explaining the situation in more detail in separate correspondence to you. From my conversation with him, it appears that the basic light aircraft procedures involving takeoffs and landings on the Ketchikan taxiway are reasonable, but perhaps extra care may be needed during times of adverse visibility to insure that the FSS coordinates all operations within several miles of the airport.

* * *

4. Text of AB: New York, NY, Kennedy International Airport: A pilot report notes that a potential conflict situation exists at this facility as a result of charted arrival and departure instructions to pilots. All runway 4L standard instrument departures out of JFK call for a climb and a right turn to a 100° heading prior to various subsequent departure routings; at the same time, the missed approach procedures for runway 4R operations call for a climb and a right turn to the outbound JFK VOR 077° radial. The reporter, whose missed approach decision resulted in another aircraft's departure being aborted, suggests that these procedures be reexamined to make certain that both arriving and departing aircraft are adequately protected in the event that a runway 4R missed approach and a runway 4L departure occur concurrently.

Text of FAA Response: The information contained in the subject report is correct as it pertains to departures making a right turn to 100° off runway 4L at Kennedy. The quoted missed approach procedure for runway 4R is also correct. While it may appear on paper that there is a conflict between these two procedures, it is the responsibility of the tower controller to insure that no conflict does occur. To accomplish this, we do not release a departure off runway 4L when an arrival to runway 4R is less than 2 miles out on final unless visual separation is applied. If for any reason an arrival should go around after landing seemed ensured, the controller must avoid a

conflict by issuing radar vectors to either or both aircraft or by cancelling the takeoff clearance for the departing aircraft. This was apparently the case in the situation described in the subject report.

The above procedures were designed for noise abatement purposes and not for any operational advantage. We believe these procedures to be safe and effective.

* * *

5. Text of AB: Various locations: Pilot-participant of several air races suggests that NOTAM's be issued to advise all enroute airports of race flyby and terminal traffic operations. The same reporter recommends that all appropriate ATC facilities along the route of flight be advised of the event and of any special arrangements that may exist to accommodate the event's operations. The pilot cited the following two examples in support of the above suggestions:

1. During two recent cross-country races, local pilots using airports along the race route had no way of knowing that race participants were scheduled to use the local airfield for checkpoint, fueling, overnight, or flyby activities. The lack of prior knowledge often resulted in traffic pattern conflicts and other operational confusion.

2. The following de-identified excerpt (quoted with permission of the reporter) illustrates the basic point of the second example:

> At our pilot briefing, the race participants were advised by the starters that the restricted areas R-1234 and R-5678 would be open for us to fly directly through to our first flyby/fuel stop at the ABC airport. We were advised to squawk XXXX to point "A" and then squawk 1200. We were also advised that we could ask for traffic advisories if we so desired and use any discrete code provided by the Center. While in R-1234 I called the ARTCC to request advisories. They gave me a transponder code and immediately came back to advise I was in the restricted area. I was given a vector to go around the restricted area; I advised Center of the pilot briefing saying the area would be open to us. The controller knew nothing of the clearance or the air race activity.

Text of FAA Response: It is impossible to speak fully to the two examples given without more information. If in example 1, the race was coordinated with the FAA and there was an FAA facility at the arrival airport then there was an obvious breakdown in communication. In example 2, the ARTCC is virtually always the controlling agency for a restricted area. They in fact would have been the authority releasing it. If they had opened the area for other than the normal user, the controller should be aware that it is open for general use. He would not necessarily need to be apprised that race aircraft would be transitioning the area.

Regardless, we are studying the reporters suggestion for NOTAM dissemination of cross-country racing information and will advise the Flight Standards Service of the possible need to include the planning, coordination, and conduct of "air race" type activities in Advisory Circular 91-45A.

6. Text of AB: Two reports have expressed concern with the Palo Alto Airport Card-A-Clearance which reads: Cleared Oakland Airport. Turn R/L to heading 060° to the ILS 27R/29 final approach course, maintain 3000 ft. If radio communication is lost after takeoff, and the 060° heading is held, aircraft will be dangerously close to terrain prior to intercepting the OAK 27R/29 ILS.

Text of FAA Response: The Palo Alto Airport departure procedures referred to were being revised at the time of this report. The new procedures specify:

Runway 30: right turn, heading 040°; runway 12: left turn, heading 020°.

These headings provide adequate terrain clearance. Card-A-Clearance documents have been revised.

* * *

7. Text of AB: Memphis, TN, north of Holly Springs VORTAC (HLI) and east of Gilmore VOR (GOE): A recent report points out the potential for communication misunderstandings as a consequence of the proximity (9 miles) and phonetically similar names of MANDY and MIDDY intersections.

Text of FAA Response: Action has been taken to change MANDY to MIOLA. Coordination has been accomplished with our Southern Region.

* * *

8. Text of AB: LaGrande, OR, LaGrande NDB: Pilot report states that during any weather condition and at any operational altitude the signal from the LGD NDB is of such poor quality that it is lost on procedure turns. Because of the mountainous terrain surrounding the LGD airport, the reporter suggests that the NDB be flight checked immediately or NOTAMed off the air.

Text of FAA Response: The LaGrande NDB is a nonfederal facility owned and operated by the city of LaGrande, OR. The airport-manager/fixed-base operator, ANW-460, and flight inspection have identified the problem as an electromagnetic interference problem rather than a coverage problem.

The facility was NOTAMed out of service and the transmitter turned off at 1500Z on September 6, 1978. The Northwest Region and Federal Communications Commission are presently investigating the interference problem.

* * *

9. Text of AB: Nashville, TN, Metro Airport and McKellar VOR (MKL): The common frequency (112.0 MHz) of the McKellar VOR and the Metro Airport VOT is reported to be causing navigation problems for aircraft enroute to the MKL VOR. The reporter, an air carrier pilot, noted

that the situation is particularly noticeable during IFR flights from BNA enroute to Memphis via the Middy One STAR.

Text of FAA Response: We have reviewed the NASA AB. The difficulty described by the air carrier pilot could be the result of using a navaid beyond its frequency-protected service volume, or could be the result of inadequate frequency protection. The McKellar VOR is a terminal (T) facility which is normally frequency protected to a distance of 25 miles and to an altitude of 12,000 ft. However, in the case of the McKellar VOR, frequency protection has been extended to 30 miles and 24,000 ft.

The Middy One STAR depicts the course to be flown between the Nashville VOR and McKellar VOR, a distance of 113 miles. The changeover point is not depicted along this route; therefore, the pilot probably utilized the Nashville VOR to the midpoint between the two facilities, a distance of 56-1/2 miles. Since the McKellar VOR is only protected within a 30-n. mi. radius, it is very likely that an aircraft utilizing McKellar to the midpoint 56-1/2 miles, would experience harmful interference from the Nashville VOT.

This has been brought to the attention of the FAA Southern Region, and corrective action is being taken to ensure that the McKellar VOR is not used beyond its frequency-protected service volume. This action should eliminate the problem.

Airports: Lighting and Approach Aids

10. Text of AB: New Orleans, LA, New Orleans International Airport: The following excerpt (quoted with the reporter's permission) describes a condition in existence at this airport:

> Recently a new, four-lane, concrete access road was built generally parallel to, and approximately 1,500 ft east of, runway 01/19. Runway 01 is served by an ILS system (and an RNAV approach); runway 19 is served by a nonprecision localizer backcourse approach.
>
> The access road is lighted in such a way as to appear like a runway and is more easily spotted from the air during times of good visibility due to the fact that the runway lights (HIRL's) are operated at a low step (normally step 2). At night, arriving aircraft have lined up on the access road thinking that it was the runway. During IFR conditions . . . the access road has also been mistaken for the runway.

The report noted that a number of pilots have commented on how much the access road looks like a runway, especially during periods of reduced visibility. The situation is alleged to be particularly critical with regard to aircraft on the nonprecision localizer backcourse approach to runway 19.

The reporter's suggested solutions to the problem include: (1) printed warnings on approach plates and airport charts, (2) NOTAM's, and (3) approach lighting systems on both ends of the runway.

Text of FAA Response: Numerous night approaches have been made on runway 1/19 by our Air Carrier Operations inspector located in New Orleans since opening of the lighted access road adjacent to that runway. That office has received no complaints concerning possible problems of identification between those lights and runway lights. The facility management of the New Orleans TRACON/Tower advises there have been no known incidents where arriving aircraft have lined up on the access road thinking it was runway 1/19. Our review disclosed that Air Traffic Services are not involved in this report. Accordingly, no additional action is contemplated as a result of the complaint. For your information, there are presently installed REIL's on both ends of the runway with a VASI 6 servicing the approach to runway 19. A RIAL on the approach to runway 1 has recently been commissioned. This response has been coordinated with ASW-200 and ASW-500.

* * *

11. Text of AB: East St. Louis, IL, Bi-State Parks Airport: Pilot report notes that the VASI equipment at this facility, especially that serving runway 12/30, is unreliable and frequently out of service. Pointing out that the runway 12/30 VASI has been out of service for several months, the reporter expressed hope that the equipment could be fixed quickly or at least NOTAMed out of service pending proper maintenance.

Text of FAA Response: Although the Office of Airports Programs has no record of having previously received this complaint, the situation described was indeed unreliable; however, it has since been repaired and is operational.

* * *

12. Text of AB: Bethel, AK, Bethel Airport: Reports have been received indicating that the rotating beacon at this facility cannot be seen more than 3 miles from the airport. Reporters contend that the dimness of the beacon has resulted in repeated, inadvertent penetrations of the airport's control zone during periods of IFR operations.

Text of FAA Response: The first airport lighting system was installed in 1949 and included installation of a DCB-224, 24-in. double-end rotating beacon. This beacon was in continuous service until the fall of 1977 when the motor drive unit wore out and the beacon was replaced with a Crouse-Hines DCB-10, 10-in. airport beacon. This new beacon meets AC 150/5345-12A specifications for L-801 beacons. This problem has been discussed with the State Department of Transportation and they have informed us that the old DCB-224 beacon is being overhauled and will be reinstalled when the repairs are completed.

As stated in the Airman's Information Manual, part 1, pages 1–14, an aeronautical light beacon is a visual NAVAID to indicate the location of an airport, a heliport, etc. Paragraph 4, pages 1–14, continues to expand on this by stating that pilots should not rely solely on the operation of the beacon to indicate weather conditions, IFR vs VFR. During daylight hours, when a visibility restriction exists, visual sighting of the airport beacon at 3 miles, or the outer edge of the control zone, may not be possible even with a larger beacon.

13. Text of AB: Chamblee, Ga., DeKalb-Peachtree Airport: A controller report notes that the painted lines defining the ramp-taxiway area from runways 2L-20R and 16-34 are so faded that taxiing aircraft frequently taxi inadvertently onto the active runways. The reporter recommends that the lines, particularly those between the ramp and runway 2L-20R, be repainted so as to more clearly delineate the runway boundaries.

Text of FAA Response: FAA representatives have met with airport management at DeKalb-Peachtree Airport to review existing ramp and taxiway markings. It has been concluded that existing markings are, to some extent, nonstandard and that an improved markings schematic should be developed which should preclude inadvertent entry onto active runways. Such a plan is being prepared and it is anticipated that new markings will be applied within the month of February, 1979.

* * *

14. Text of AB: It has been reported that the electric wind direction indicator at the Daggett, CA FSS has been in error by as much as 50°, and that it seldom indicates closer than 15° to 20° from the true wind direction. It is alleged that this condition has existed for several years, and that attempts to correct the problem have resulted in only temporary improvement.

Text of FAA Response: The Center Field Wind System at Daggett, CA was recalibrated and restored to service. Indicator errors were noted and corrected at this time. Calibration was accomplished by National Weather Service (NWS) personnel.

* * *

15. Text of AB: Little Rock, AR, Adams Field Airport: Two recent reports describe an aircraft on taxiway F crossing the end of runway 32 when runway 14 was active. While the crossing aircraft did not contact ground control, both reporters suggest that there is a need for appropriate markings on taxiway F to indicate to pilots that taxiway F crosses the end of runway 32/14 and to give pilots a visible hold short point when runway 32/14 is active.

Text of FAA response: The Alert Bulletin has been discussed by the Arkansas Division of Aeronautics, the Adams Field Airport Management, and the FAA including Airports, Flight Standard, and Air Traffic personnel. The crux of the problem is allegedly insufficient markings on taxiway F; however, hold lines and runway intersection signs conforming with current standards were installed during a recent ADAP project. Although no details of the incidents are known, their infrequency suggests that the problems were a matter of inattention rather than a system deficiency.

No amount of reconfiguration or installation of new guidance facilities will provide an efficient yet fail-safe system. All airport users have a responsibility to operate safely on the field. In our opinion, this intersection conforms to standards and no corrective action is required.

* * *

16. Text of AB: Santa Barbara, CA, Santa Barbara Municipal Airport: The lack of taxiway or runway signs is allegedly creating a potentially hazardous situation at this airport, which serves air carriers, general aviation, and military operations. According to a recent report, the absence of any directional indicators on the airfield has resulted in frequent conflicts between taxiing aircraft and aircraft operating on active runways. The reporter points out that the problem is compounded by the coastal fog that frequently settles in the area.

Text of FAA Response: The manager of the subject airport was contacted and advised of the bulletin contents. It dealt with the lack of advisory signs near the intersections of taxiways and runways. It was reported that pilots of taxiing aircraft, especially during periods of coastal fog on the airport, are having trouble identifying certain intersections.

The airport manager was aware of this problem and is in the process of identifying the locations for the signs. He intends to coordinate this effort with the ATCT, FBO, and air carrier users. The signs are to be posted as soon as possible and he is to inform this office when completed.

* * *

17. Text of AB: San Jose, CA, San Jose Municipal Airport: A recent report notes that a number of light aircraft located in the runup area for runway 30L at SJC have been damaged or badly buffeted by the blast from turbojet aircraft turning onto runway 30L from taxiway A. The reporter suggests that the runup area be relocated, possibly to the other side of taxiway A, opposite the current location.

Text of FAA Response: The holding apron for runway 30L at San Jose Municipal Airport is constructed in accordance with current FAA standards. General aviation runways at this airport are 30R and 29 which do not have this problem.

ATC: Facilities and Procedures

18. Text of AB: New York, NY, Newark Airport Departures: Several reports have been received by ASRS regarding nonuse of preferential departure routes by air carrier aircraft departing EWR southbound. Preferential route is EWR-CRAN 7-MIV, Shads transition. Requested and flown route is usually EWR-JFK-Plume. Use of this routing is alleged to have caused a number of potential conflicts and problems for LGA and JFK traffic, depending on runway configurations at the latter airports. In a recent case involving a loss of communications and weather problems, the disruption was severe. Reporters suggest that adherence to the preferential routing would alleviate the problem.

Text of FAA Response: We have reviewed the enclosed Aviation Safety Report and only partially agree with the suggestion.

In our normal operation we do strictly adhere to the published preferential routing from Newark for departures proceeding over MIV. The exceptions occur during periods of light traffic in the metropolitan area when there is very little impact on other traffic in the system or when severe weather affects our departure routes.

Each request, by an aircraft on the ground at Newark, for the Plume departure routing, is handled at the time of the request. If the requested routing would have any impact on the other two metropolitan airports we deny the request and issue the published preferential routing over MIV.

During periods of severe weather, the Plume departure routing may be one of the only available open routes out of the New York area. It is imperative that we maintain the flexibility to assign this and any other route during these conditions.

Whenever the Plume departure route is used, specific coordination is accomplished and procedures are implemented for the handling of the aircraft. The use of this departure route does increase the complexity of the system in the New York area but we do not believe that it compromises safety when handled correctly.

* * *

19. Text of AB: Charlottesville, VA, Charlottesville-Albermarle Airport: A controller reports that following a call from an aircraft experiencing engine problems, CHO ATCT attempted to obtain either a radar fix or direction finding (DF) assistance for the aircraft. The Washington ARTCC did not show any transponder return for the aircraft even though the plane was known to be at 6,500 ft MSL, squawking code 1200. In addition, the request for DF assistance was denied by the Washington F.S.S. on the grounds that "no qualified DF operators were available." The report notes that the plane landed safely because the aircraft's altitude and the prevailing visibility permitted the pilot to make it to the airport without the requested ATC or DF assistance. While suggesting that ATCT radar coverage for the Charlottesville area would be beneficial to all local operations, the reporter contends that at the very least, qualified DF operators should be available to provide assistance, especially during the frequent periods of reduced visibility in this area.

Text of FAA Response: The training officer at the Washington FSS, while not recalling the incident in question, confirmed that at the time of the alleged occurrence the facility was in the process of checking out their personnel as being DF-qualified. At that point, just a few of the specialists had received the necessary training. This situation, a belated training program, resulted from the lengthy delay incurred in remoting the DF from Charlottesville to the Leesburg site due to technical difficulties. Unfortunately, the incident took place just a few weeks later when there was no one on shift fully qualified to work the position.

Since then, however, the majority of the personnel have checked out on the DF operation, and the reporter's contention that assistance is lacking in this area is no longer valid.

As a matter of information, the remoting of the DF was the final action associated with the closing of the Charlottesville FSS and its consolidation with the Washington FSS in Leesburg, Virginia.

* * *

20. Text of AB: San Juan, PR, Puerto Rico International Airport: Controller report points out that SJU Approach Control is not assigning the preferred initial southbound routing to flights departing SJU enroute to Santo Domingo. The preferred routing southbound prior to any westerly

heading allows climbing, westbound aircraft out of SJU to be separated from descending, inbound traffic headed for DDP. The reporter contends that this failure to provide initial southbound headings results in extra controller workload, unnecessary vectors for departing aircraft, and needlessly mixes inbound and departing traffic in the same general airspace.

Text of FAA Response to AB: The reporter contends that an existing air traffic procedure at San Juan, PR, causes extra workload, unnecessary vectors, etc. As at most locations, controllers, through coordination, frequently shortcut established departure/arrival routes in the interest of efficiency, noise abatement, or fuel conservation. The established procedures are normally designed to provide air traffic guidance for the heaviest volumes of air traffic a facility experiences.

If a controller believes that deviations from these routes at any particular time are unwarranted because of workload, he should immediately apprise the other controllers and his supervisor.

* * *

21. Text of AB: Gaithersburg, MD, Montgomery County Airport: A recent report concerning an aircraft accident during approach to GAI points out that IAD approach control has better radar coverage of GAI and FDK, and also has MSAW function for these airport areas, yet Baltimore approach control controls this airspace, requiring landline reports of altitude alerts, etc., from IAD to BAL. Reporter points out that delays are inevitable in transmission of such critical information to pilots under this arrangement.

Text of FAA Response: The report is erroneous: The facts are:

1. Flight check data of the Dulles and Baltimore radar systems indicate that Dulles does not have better coverage than Baltimore in the Gaithersburg-Frederick area. They are about the same.

2. Montgomery County Airport is in the Baltimore approach control area because the most effective air traffic control service can be provided with this configuration in that area. Traffic flow, airway alignment, and communications capabilities, as well as radar coverage, dictated the decision.

3. Both facilities (Baltimore and Dulles) have ARTS III equipment with MSAW capability. Because it has control jurisdiction for the airport, the Baltimore ARTS III is adapted to provide MSAW approach monitoring for aircraft landing at Montgomery County Airport. Dulles is not so adapted because it would not be controlling such aircraft.

* * *

22. Text of AB: Carlsbad, CA, Palomar Airport: A recent report describes an occurrence involving a pilot who requested a special VFR approach to CRQ through SAN approach control. He was instructed to "Hold, VFR, east of the Escondido NDB (EKG), standard pattern, right turns at 4,500 ft." Another aircraft was holding at 3,500 ft. Ten minutes after commencing the hold, the pilot heard another aircraft given identical holding instructions at the same altitude of 4,500 ft (two other aircraft were later given the same clearance). The pilot called to remind approach control that he was at the same altitude and was told that he had been given a VFR clearance and the pilots were to maintain their own separation. Weather at the time was 500 overcast, 1-mile visibility, tops were between 1,600–1,800 ft. Although the reporter, a highly experienced pilot, recognizes that this was

a VFR clearance, he questions the wisdom of providing a standard holding pattern clearance under the conditions, and points out that less experienced pilots would be likely to accept suggested altitudes as assigned – in short, to think and act as though they had been given a standard IFR clearance. Further, he notes that information as to other traffic in the same holding pattern at the same altitude was not provided by ATC. Finally, he questions the wisdom of not providing *suggested* altitudes and asks whether such suggested altitudes could not provide vertical separation between aircraft.

Text of FAA Response: In investigating this incident, we were not able to determine what had actually happened. The details of this report suggest that the reporter encountered an abnormal situation. San Diego approach control does not provide special VFR service to Palomar Airport. Palomar tower has been delegated this responsibility. Palomar tower does not use navigational aids as VFR holding points, also the Escondido NDB is too far away (10-1/2 miles) from Palomar to be of use to the tower as a holding fix. Neither facility assigns mandatory altitudes to VFR aircraft.

Regardless of which facility provided the service in question, the actions described are contrary to standard ATC procedures. Each facility will instruct their personnel in the correct procedures to be used by controllers in handling requests by VFR pilots for special VFR clearances.

* * *

23. Text of AB: New York, NY, La Guardia Airport: A pilot reports that while approaching New York from the south at high altitude, reception of LGA ATIS on 125.95 MHz is interfered with by RIG ATIS, also on 125.95. He asks whether one or the other frequency can be changed.

Text of FAA Response: The Eastern Region has not been able to supply any information on this problem. The La Guardia ATCT has not had any complaints of interference to their ATIS broadcasts on 125.95 MHz. The assignment is frequency-protected to a distance of 40 n. mi. at an altitude of 25,000 ft. We can only assume that the aircraft experiencing the interference was outside this volume of airspace.

We do not plan to change either the La Guardia or Richmond ATIS frequency.

Hazards to Flight

24. Text of AB: Pittsburgh, PA, Greater Pittsburgh International Airport: A pilot reports that during takeoff on runway 28R his aircraft's landing gear hit one of a herd of unreported deer, even though he executed an abrupt pullup maneuver to avoid the animals. The pilot notes that he has received deer warnings from ATC several times in recent weeks at this facility. The report also points out that another deer was fatally struck by an aircraft on runway 10L approximately 2 weeks prior to the reporter's incident. The reporter suggests that some additional form of security, such as fencing, electrical restraints, lights, or a combination of measures may be indicated to eliminate or control a potentially critical condition, particularly during nighttime operations at the airport.

Text of FAA Response: Deer control programs include spraying of the outer grass areas with a persistent deer repellent and the harvest of deer by the Pennyslvania Game Commission in and around the airport area.

Future programs will include controlled harvest of deer by hunters (shotgun only), and the removal of all trees and bushes in the area now being used by the deer. We are also exploring the feasibility of installing a deer control fence around the perimeter of the airport.

* * *

25. Text of AB: Evansville, IN, Dress Regional Airport (EVV): Pilot reports indicate that the dike off the approach end of runway 27 is a hazard. Chart AL-513 does show an obstruction that might be the dike, but the complaint is based on the camouflaging of the dike by the fact that everything is green grass, and no obstruction stands out. Concern is about striking gear on dike.

Text of FAA Response: In October 1977, the U.S. Soil Conservation Service Completed a project to improve this dike. At the present time the dike provides a 20 to 1 approach to runway 27. In addition, there is a two-way road along the top of the dike that provides a definite contrast with the grass.

* * *

26. Text of AB: A report indicates that precipitation (rain) at JFK airport was omitted from two consecutive hourly weather observations. When questioned by ATC, the weather observer advised ATC that it was not required to be noted because the precipitation did not hamper vision. It is suggested that controllers and pilots have a need for precipitation information as it may affect flight and landing operations.

Text of FAA Response: The weather observer's response to ATC was incorrect because the occurrence of precipitation should be reported irrespective of the visibility. The intensity of precipitation is estimated on the rate-of-fall basis, except that the intensity of drizzle or snow can be estimated using the visibility as a criterion if drizzle or snow is occurring alone.

The above NASA report has been brought to the attention of the National Weather Service.

* * *

27. Text of AB: Portsmouth, VA, Chesapeake-Portsmouth Airport: Lighted towers NNW of this airport are reported to be 200 ft higher than the 800 ft traffic pattern used by light aircraft operating into the field. While noting that this condition is particularly important to aircraft executing a normal downwind entry to runway 02, the report also suggests that some possibility for conflict exists for aircraft on base leg entries into the runway 10 traffic pattern. The reporter recommends right traffic patterns for runways 02 and 10; notations regarding the locations of the towers were suggested for both AIM, part 2, and other industry-published airport directories.

Text of FAA Response: We have reviewed this report through our Air Traffic Division in the Eastern Region. They, in turn, investigated the situation in conjunction with the appropriate General Aviation District Office and the airport manager.

The several towers are located approximately 2 miles from the airport and outside of the traffic pattern. They are presently depicted on the IAP and VFR navigation charts. Additionally, provisions have been made to accept and publish the appropriate notation in AIM, part 2.

The airport manager has considered altering the left traffic pattern to a right for runways 2 and 10 but is convinced it will result in more confusion than safety.

* * *

28. Text of AB: North Naknek, AK: A television broadcast tower, described as being in proximity to three airfields, is reported to be operating without any aviation obstruction lights. The tower, stated to be 250 ft tall and 1 mile east of the "State field," is characterized by the reporter as a hazard to air traffic, particularly during the low visibility and long periods of darkness of the winter months.

Text of FAA Response: The Alaskan Region reports that upon investigation, the tower has obstruction lights which were out due to a generator failure; this generator was repaired. Also, the tower is about 6 miles from the airport and is 125 ft as opposed to the 250 ft reported.

Military-Civilian Coordination

29. Text of AB: Hampton, GA, Atlanta Air Route Traffic Control Center: FAA controller reports that the scheduling activity for Military Training Route IR-722 utilizes procedures that may compromise safe separation standards. Reporter cites incidents in which pilots using the primary entry point for IR-722 are unaware of other aircraft joining the route at the alternate entry point and vice versa. He suggests a review of present IR scheduling procedures and recommends that pilots planning entry to the route via either the primary or the alternate point be advised of other aircraft scheduled to use the route.

Text of FAA Response: The question of operations on IR-722 (a MARSA MTR) concerns FAA separation requirement/responsibility of military flights using primary entry points outside Atlanta ARTCC airspace (Roanoke, VA, APCH. CONT.) while other military flights may be simultaneously using the alternate entry in Atlanta's airspace.

FAA Handbook 7610.4D (para. 39) requires military commands authorizing MARSA to ensure the terms of use are documented and coordinated with the control agency having airspace jurisdiction. ARTCC's are the ATC focal point for IRs.

FAA Order 7110.77, appendix 3, specifies procedures which correspond to paragraphs in Handbook 7110.65A. Paragraph 1513.b requires agreed-to procedures for applying MARSA to be contained in an LOA.

Atlanta ARTCC and 9th USAF have an LOA which governs operations on IR-722. That LOA outlines specific separation standards and responsibility.

To clarify responsibilities surrounding MARSA, the following procedures will be added in Order 7110.77, when it is revised later this year:

"ATC facilities' sole responsibility concerning the use of MARSA is to provide separation between participating and nonparticipating aircraft. When MARSA is provided through route scheduling, and circumstances prevent the pilot from entering the route within established time limits, it shall be the responsibility of the pilot to inform the ATC facility and advise his intentions."

The substance of this bulletin has been brought to the attention of the FAA Southern Region for discussion with the 9th AF, and HQ, USAF for information and any action they deem appropriate.

* * *

30. Text of AB: Tucson, AZ, in the vicinity of Tuscon International Airport: Reports received from local pilots describe a potentially hazardous condition in the civilian pilot/student practice areas west and south of TUS. Recent changes in the placement of military training routes are reported to have resulted in a significant increase in the mix of civilian flight instruction operations and high-speed, low-level military operations in this area. Several reporters suggest that redesignation of either the civilian practice areas or the military training routes, or establishment of nonconflicting altitude assignments is necessary to eliminate the recently enhanced conflict potential.

USAF Response: Davis-Monthan AFB reports that the MTRS have been redesigned and there is now no conflict with civilian training areas. Keywords: Military Low-Altitude Training Routes, Mixed Military/Civil Traffic, Potential Conflict.

* * *

31. Text of AB: Dallas, TX, Dallas NAS (Hensley Field) and DFW Tracon: A controller report alleges that local operating procedures currently in effect between the NBE ATCT and DFW Tracon involve an inordinate amount of coordination for aircraft departing NBE. Due to the arrangement of airspace and the provisions of the current ATC agreement, four air traffic control positions must coordinate before a military aircraft can be released from NBE. Furthermore, the reporter notes that at one point in the military departure sequence two different controllers are handling traffic in the same airspace. The controller states that a recent less-than-standard separation occurrence involving two civil aircraft and one flight of military aircraft was the direct result of a combination of an excessive amount of ATC time spent on military-civil coordination, and the hesitancy on the part of one of the civil pilots to fly any closer to the military traffic than he already had as a result of following ATC instructions.

Text of FAA Response: The assessment of coordination made by the controller in the subject report is correct. Due to the high-performance jet traffic operating from Dallas Naval Air Station, the location in relation to other airports, and traffic flow in the DFW metroplex, this coordination is necessary to provide separation and safety in the area.

Concerning the statement that two different controllers are handling traffic in the same airspace, the facility has no procedure that requires this situation.

The recent less-than-standard separation occurrence described in the text resulted in a system error. This error was generated by one controller allowing an aircraft to enter airspace assigned to another controller *without* affecting coordination.

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16. Abstract
This ninth quarterly progress report of ASRS operations contains two analytic studies and a section illustrating the alert bulletin process.

The first study, Distraction – A Human Factor in Air Carrier Hazard Events, looks at one of the human factors frequently mentioned in ASRS reports as a cause of or contributor to hazardous events. The report describes a study of distractions, an element in the series of investigations of air carrier human factors being conducted by the ASRS research group.

The second study, A Summary of the Characteristics of the ASRS Database, discusses the attributes of the safety reports that have been analyzed, processed, and entered into the ASRS database since the program's inception.

A sampling of alert bulletins and responses to them is also presented.

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